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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,210	10/15/2003	Allen Petroskey	COL/04	5900

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EXAMINER

LE, HUYEN D

ART UNIT PAPER NUMBER

3751

DATE MAILED: 02/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/686,210	Applicant(s) PETROSKEY ET AL.	
	Examiner James P. Hughes	Art Unit 2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 10-5-06.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 136 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10-5-06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to claims 1-36 have been considered but are moot in view of the new ground(s) of rejection.
2. Applicant challenges the support of a teaching of a silicide layer over a doped layer in the provisional application of (60/457,242) Montgomery. (See pages 10 and 11 of the amendment) First, it is noted that Montgomery is used as a teaching reference. Following, there is support in the provisional application of Montgomery for this teaching, see e.g. page 20 of the provisional application.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-4, 6, 8-11, 13, 15, 21-24, 26, and 28-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Shirane et al. (2002/0146196). Shirane teaches a method and apparatus for applying electrical control to a photonic crystal structure comprising a photonic crystal (e.g. of gallium arsenide) – situated on a substrate (e.g. 70) – having a region of relatively high index of refraction wherein light is confined/guided (e.g. 72,77). There is a plurality of apertures (e.g. see fig. 11 and 12) formed through the substrate that are filled with a lower refractive index material.

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Electrical control of the device is provided by two lateral electrical contacts (80 and 81) coupled to the photonic crystal, wherein both contacts are optically isolated from the waveguide (e.g. 77) by the plurality of apertures. The electrical contacts may be made of metal alloy and doped to form "n" and "p" type regions and may be formed by depositing a metal electrode material on the doped semiconductor layer. (See e.g. paragraphs 64-77 and Figs. 11 and 12)

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1, 5, 7, 12, 14, 21, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirane et al. (2002/0146196). Shirane teaches a method and apparatus for applying electrical control to a photonic crystal as discussed above.

However, Shirane does not explicitly teach that the electrical contacts are substantially identically doped or that the exact doping profile of the substrate (or exact substrate material) in the region of the waveguide.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide various doping configurations and/or dope the first and second electrical contacts identically because this would allow an even current injection method. One of ordinary skill would have been motivated to do so because it would yield an efficient control device.

3. Claims 21 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirane et al. (2002/0146196). Shirane teaches a method and apparatus for applying electrical control to a photonic crystal as discussed above.

However, Shirane does not explicitly teach that if the electrical contacts are controlled via applying a forward or reverse bias to the contacts. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate forward bias to the contacts to yield the optimal results for application specific tasks. One would have been motivated to do so to yield an efficient device.

4. Claims 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirane et al. (2002/0146196) in view of Baba et al. (6,522,448). Shirane teaches a method and apparatus for applying electrical control to a photonic crystal as discussed above.

However, Shirane does not explicitly teach that the apparatus may be used in an optical delay line, a switch, or a photodetector.

Since these are all commonly used optical devices – e.g. as shown by Baba et al. (6,522,448) – and the invention of Shirane may be employed as a general semiconductor device, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the device of Shirane in such optical devices because the device of Sugitatsu will provide an efficient means for control of an optical device.

5. Claims 32-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirane et al. (2002/0146196) in view of Montgomery et al. (6,845,198). Shirane teaches a method and apparatus for applying electrical control to a photonic crystal as discussed above.

However, Shirane does not explicitly teach that the electrical contacts are used to control the waveguide properties via thermo-optic effects, or the specific steps of forming the electrodes with a silicide contact layer over the dopant layer.

As silicide layers over dopant layers are well known for providing electrical contacts in electro-optic devices – as taught i.e. by Montgomery (See e.g. Col. 4, ll. 1-20) – it would have been obvious to one of ordinary skill in the art at the time of the invention to employ a silicide layer over the dopant layer in the electrodes of Shirane because this would allow an efficient electrode contact.

Shirane teaches a method and apparatus for applying electrical control to a photonic crystal as discussed above. Wherein it is taught, as is commonly known, that applying a current to the electrodes (8n and 8p) will heat up the device – thus the substrate will be heated as current is applied to the electrodes and cooled as the current is reduced. The phrasing in the preamble of

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claim 32 of "thermo-optic control" is not given significant patentable weight because it does not necessary breath life into the claim. (See e.g. paragraphs 64-77 and Figs. 11 and 12)

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James P. Hughes whose telephone number is 571-272-2474. The examiner can normally be reached on Monday - Friday 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James P. Hughes  
Patent Examiner  
Art Unit 2883



Frank G. Font  
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